Status of CMSIM-HCAL Certification

Sunanda Banerjee/Shashi Dugad

Tata Institute of Fundamental Research

26-Sep-2001

Certification Criteria

Simulate single particles (muons and pions) @ different eta values

Compare the energy loss distribution in each scintillator and electronic (HAC) layer for different CMSIM releases

Generate GEANTINO @ different eta/phi and compare the radiation/interaction length for sensitive region and absorber

Tool development

Geometry file for HCAL detector changed to get the scintillator layer no.

Scint layerwise hit information is made available in CMSIM environment under CMSIM-122 release.

Hit information for HCAL detector stored in NTUPLE

Analysis carried out through KUMAC; generates one page report of comparison

Simulation Progress

Muons for three different releases simulated at Pt = 10 GeV

Effect of GEANT parameters on energy loss distribution being studied

Simulation of pion runs is under progress

What is remaining?

Analysis of pion runs

Simulation of GEANTINO

Reading of ECAL hits and studying its response for 50 GeV photons

Package exist in expert mode; to be made available in user mode …. To be released as part of CMSIM release.

GEANT Parameter study

10 GeV Muons shooted at eta=0.0435 for ILOSS=1 and 2

	Mean (MeV)		RMS (MeV)	
	ILOSS=1	ILOSS=2	ILOSS=1	ILOSS=2
HAC L00	1.71	1.71	0.81	1.11
HAC L2A	13.98	13.94	7.80	10.56
HAC L2B	1.82	1.81	1.54	1.76
HAC L3	4.81	4.43	3.70	3.75

Summary Report of comparison

Summary of comparison between two different releases

CMS Release	121	122
File Name	cms121_muon2_01.hbook	cms122_muon2_01.hbook
Particle ID	5	5
Minimum Eta	0.0435	0.0435
Maximum Eta	0.0435	0.0435
Minimum Pt (GeV)	10	10
Maximum Pt (GeV)	10	10
Minimum Phi	0	0
Maximum Phi	360	360
Mean of Scint. Layer	9.05918	9.05039
Mean of HAC Layer	2.22291	2.22066
Mean of Eta dstbn.	0.0413036	0.0407469
Mean of Phi dstbn.	182.218	179.514
Mean of Time dstbn.	8.04962	7.98234
RMS of Time dstbn.	3.62932	2.09301
Mean E.Loss/Hit (MeV)	1.16468	1.17563
RMS E.Loss/Hit (MeV)	1.97074	1.93468
Mean E.Loss in HAC L01	1.71353	1.72418
RMS E.Loss in HAC L01	0.816064	0.815393
Mean E.Loss in HAC L2A	13.9754	14.2245
RMS E.Loss in HAC L2A	7.79827	7.94415
Mean E.Loss in HAC L2B	1.8157	1.83984
RMS E.Loss in HAC L2B	1.53508	1.47673
Mean E.Loss in HAC L03	4.81806	4.81279
RMS E.Loss in HAC L03	3.69533	3.85939

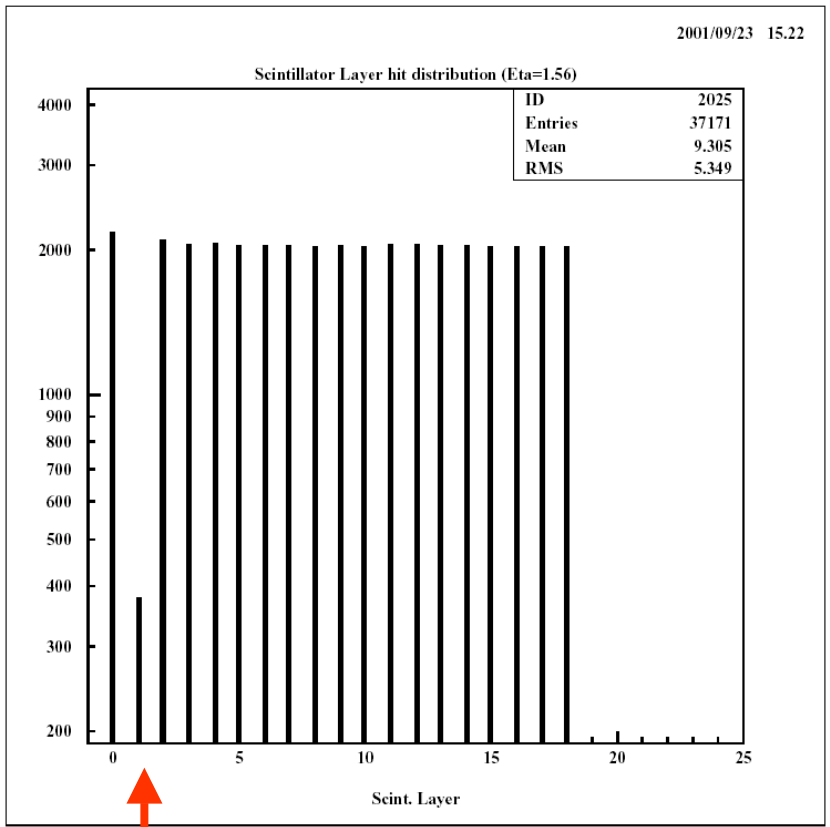
Summary Report of comparison

Energy Loss in each Scintillator Layer

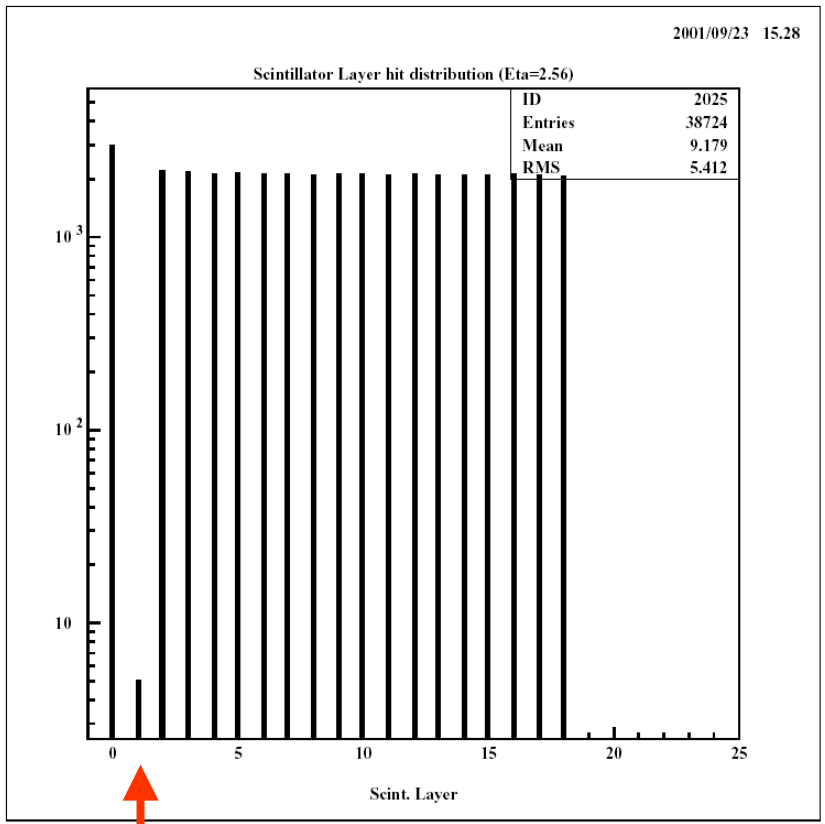
Layer No.	CMS Release 121		CMS Release 122	
	Mean (MeV)	RMS (MeV)	Mean (MeV)	RMS (MeV)
0	1.71353	0.816064	1.72418	0.815393
1	0.864476	0.624833	0.896994	0.728338
2	0.867568	0.57608	0.879614	0.642205
3	0.864094	0.636967	0.868714	0.623097
4	0.876653	0.667139	0.88151	0.649652
5	0.873649	0.62004	0.872079	0.534545
6	0.855635	0.476137	0.883094	0.719262
7	0.873764	0.673707	0.906196	0.815222
8	0.87906	0.649334	0.868378	0.538827
9	0.876212	0.645837	0.876933	0.763439
10	0.882796	0.742549	0.881731	0.573958
11	0.879299	0.597162	0.889315	0.669527
12	0.859692	0.45939	0.883622	0.611823
13	0.867543	0.604611	0.875892	0.532866
14	0.888825	0.679073	0.886017	0.68018
15	0.858949	0.487035	0.874046	0.649464
16	1.8157	1.53508	1.83984	1.47673
17	2.52684	1.99363	2.52251	2.11486
18	2.19854	1.97688	2.16541	1.49772
19	0.005	0	0.005	0
20	0.005	0	0.005	0

HE Muon Simulation Study

Eta = 1.56



Eta = 2.56



Under investigation